A Novel Borate Ion Selective Electrode Based On Carbon Nanotube-Silver Borate

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doi: 10.20964/2020.01.40

Received: 1 June 2019 / Accepted: 7 July 2019 / Published: 30 November 2019

A novel miniaturized borate selective composite membrane electrode based on carbon nanotube-silver borate is described. The developed electrode exhibited a stable and linear potentiometric behavior over the concentration range of 1×10^{-1} M and 1×10^{-4} M borate ion with a Nernstian slope of 34 mV/decade and a limit of detection of 2×10^{-5} M. The electrode showed a clear selectivity to borate ion over sulfate, chloride, nitrate and many other inorganic acid anions. The response time of the electrode was found less than 14 s. Potentiometric readings of the electrode were consistent, when pH was between 4 and 8, through almost 3 months. The developed borate-selective composite membrane electrode was directly applied for the quantification of borate ions in real water samples. The results obtained by the developed electrode method was statistically analyzed and compared with those obtained by ICP-MS method. No significant differences for either accuracy or precision were observed.

Keywords: Borate selective composite membrane electrode, Borate in environmental waters, Potentiometry, Carbon nanotube-silver borate

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